U.S. Department
of Transportation

**Federal Aviation
Administration**

FAA Northwest Mountain Region
17900 Pacific Highway South
C-68966
Seattle, Washington 98168

Edition 3, September 28, 1984

DESIGNEE NEWSLETTER

Aircraft Certification Division
Transport Airplane Certification Directorate

About The Cover

ADVANCED TRISTAR

Bearing the signature "Advanced TriStar," Lockheed-California Company's first test L-1011, Ship One, is known as both the oldest and newest TriStar in service. Ship One made the first L-1011 test flight November 16, 1970, and has since flown more than 1500 missions, helping develop and certificate new technology for future service. To maintain the L-1011's title as the world's most technologically advanced jetliner, Lockheed has continually developed advancements which were first incorporated into Ship One for testing before being offered as standard equipment. Advanced features now on Ship One include:

o Autoland

o Automatic Brakes

o Active Aileron Controls

o Auto Takeoff Thrust Control

o Composite Materials

o Area Navigation System

o Pitch Active Control System

o Digital Autopilot

o Direct Lift Control

o Extended Wingtips

o Flying Stabilizer

o Flight Management System (FMS) including 4D Capability

o Moving Map Display

(Our thanks to Lockheed Flight Test, Palmdale, California, for the cover photo and accompanying article). ††

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Transport Airplane Certification Directorate

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Dear Designee:

In the last issue of the The Designee Newsletter, I encouraged FAA-designee meetings to be held to further enhance good communication, which is a must for properly carrying out the responsibilities and objectives of the Aircraft Certification Division. Since then, we have had several meetings with you. I hope you consider them worthwhile.

The Seattle Aircraft Certification Office's Modification Branch held such a meeting in April of this year, with over 30 modification DER's in attendance. Some of the topics discussed were: the history and administrative matters of the DER system, agency trends toward wider and better use of the DER system, improved methods for providing guidance and support to DER's, and project documentation and data requirements. I have received enthusiastic feedback concerning the content, tone, openness, and frankness of the presentations and question/answer sessions.

The by-product of this type of two-way communication is both parties garnering a better understanding of each other's role in aircraft certification. By continuing these Designee/FAA meetings, I hope we can further enhance our working relationships.

Leroy A. Keith

FAA/DER Meeting, Seattle, April 1984

LEROY A. KEITH, Manager
Aircraft Certification Division

FAA EMPLOYMENT OPPORTUNITIES

The Transport Airplane Certification Directorate currently has a number of vacancies at the GS-5 through GS-13 levels ($17,383 to $47,226 per annum) for qualified aerospace engineers in the following specialties: airframe, systems and equipment, propulsion, flight test, and modifications.

These positions are located in Long Beach and Hawthorne, California; Seattle, Washington; Denver, Colorado; and Anchorage, Alaska. They require, as a minimum, a BS degree in engineering for the GS-5 entry level. Further education and/or certification experience will qualify an applicant for higher grade levels.

If you or anyone you know is interested in more information about FAA employment, contact:

Joseph R. Staab
Technical Support Group
Aircraft Certification
Division, ANM-100
FAA, Northwest Mountain Region
17900 Pacific Hwy S., C-68966
Seattle, WA 98168
(206) 431-2105

The Federal Government is an equal opportunity employer.

Office Profile

THE AIRCRAFT CERTIFICATION FIELD OFFICE OF THE YEAR -- WESTERN ACO, ANM-170W

The Western Aircraft Certification Office (ACO) has been named the "ACO of the the Year" by the Director, Office of Airworthiness, FAA Headquarters, Washington, D.C. The criterion for selection for this award is overall performance with particular emphasis on contributions to aviation safety.

The Western ACO, ANM-170W, is located in Hawthorne, California. Its geographic area of responsibility covers the states of California, Arizona, and Nevada, an area with one of the highest concentrations of aircraft certification and modification activity in the country for both general aviation and transport category airplanes. With the absorption of the functions of the former Honolulu ACO, the Western ACO's scope of responsibility has expanded to include the Far East, Southeast Asia, and the Pacific Basin. The ACO currently has a total of 55 employees plus one National Resource Specialist in Flight Management.

The ACO is responsible for a variety of certification projects--ranging from the simple to the very complex. These include both transport and light aircraft, helicopters, engines, balloons, and gliders. The ACO's engine certification work includes turboprops, pure jets, and fan engines.

Some of the projects that the ACO worked on during 1983 were the all-composite Lear Fan, the AVTEC 400, and the single engine canard-configured OMAC. The ACO also certified a new turboprop version of the DC-3 with the P&W PT-6 engines. The first business jet Electronic Flight Instrument System (EFIS) was certified by the Western ACO, and work on an all-metal FAR 23 single engine, 1200 horsepower turboprop transport project is in progress now at the ACO.

In addition to their certification workload, the ACO is also charged with continued airworthiness responsibilities. The ACO credits company and consultant Designated Engineering Representatives with helping it to continue to meet heavy workload demands.

Photographs of the employees of the Western ACO are featured throughout this issue of the Designee Newsletter.

Congratulations to Charlie Blomer, Manager, and the other employees of the Western ACO for a job well done! ††

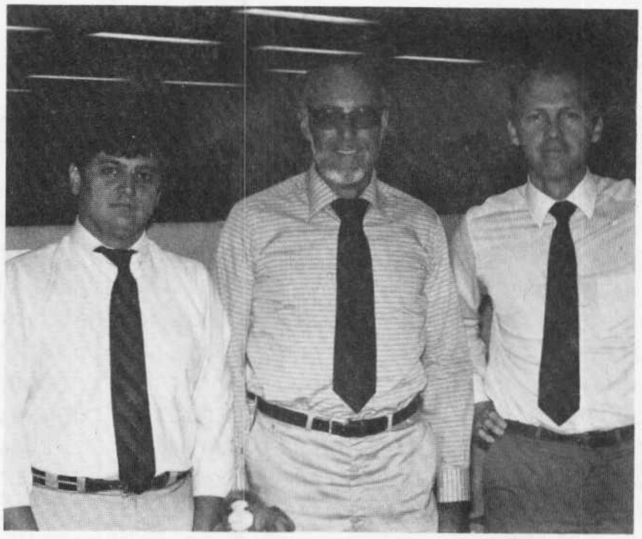
l. to r. GARY NAKAGAWA, PAT HAMEL, CHARLES BLOMER, BEULAH CRAWFORD, Office of the Manager, Western ACO

Proposed Rules

NPRM 84-1, Market Survey Experimental Certificates for Aircraft Modifiers, was published in the February 21, 1984, Federal Register. This notice proposes to amend FAR Part 21 to permit certain aircraft modifiers to apply for an experimental certificate to use the modified aircraft for market surveys, sales demonstrations, or customer crew training in the same manner as aircraft and aircraft engine manufacturers. Closing date for comments was April 23. ††

NPRM 84-4, Standards for Approval of an Automatic Takeoff Thrust Control System was signed by the Director of the Northwest Mountain Region on January 27, 1984. This Notice announced the FAA's intent to amend Part 25 of the Federal Aviation Regulations (FAR) to specify the airplane and equipment airworthiness standards for the installation of an automatic takeoff thrust control system (ATTCS). This Notice appeared in the Federal Register on April 27, 1984 (49 FR 18240), and the comment period closed June 26, 1984. The comment period was reopened to allow industry and all interested parties additional time in which to study this proposed rule change and provide comments. The reopened comment period closed August 27, 1984. ††

NPRM 84-11 Fire Protection for Cargo and Baggage Compartments. This Notice announces the FAA's intent to upgrade the fire safety standards for cargo and baggage compartments in transport category airplanes by establishing new fire test criteria and by limiting the volume of Class D compartments. This Notice will appear in the Federal Register on August 8, 1984. Comments on the Notice must be received on or before October 8, 1984.



l. to r. G. MARANIA, F. HOERMAN, P. NOE, Flight Test, Western ACO

Advisory Circulars (AC)

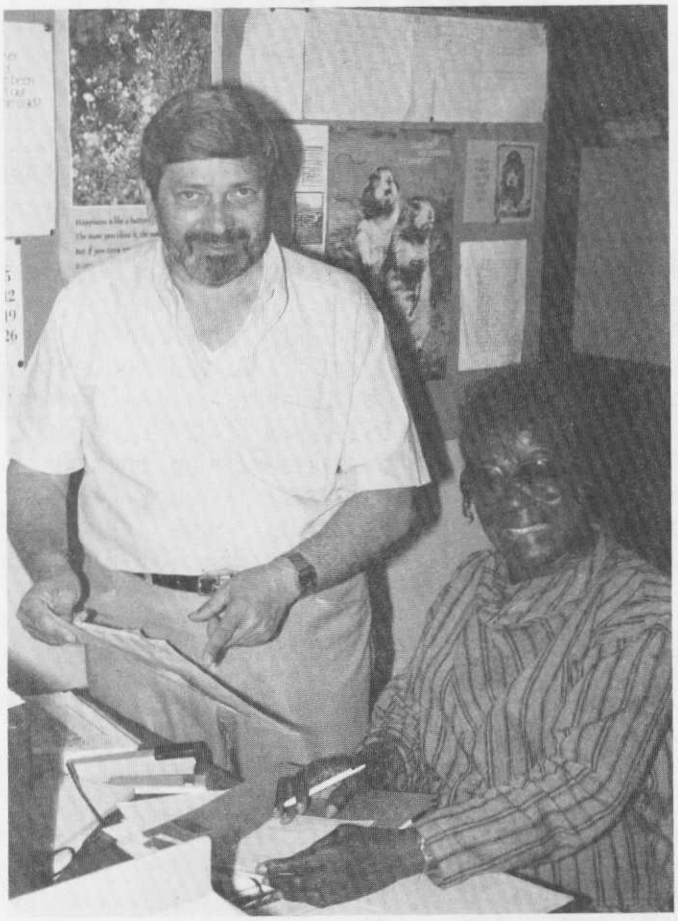
AC 25.629 Flutter Substantiation of Transport Category Airplanes describes means of demonstrating compliance with the regulations dealing with the design requirements for transport category aircraft to preclude flutter and other aeroelastic phenomena. A Notice of Proposed Rulemaking (NPRM) announcing the availability of the draft AC and requesting public comment was published in the Federal Register on June 15, 1984 (49 FR 24749). The closing date for comments on this draft AC was August 14, 1984. A copy may be obtained by contacting the project engineer, Jim Haynes, at (206) 431-2113.

AC 25.994-XX Flammable Fluid Components Affected By Wheels-up Landing concerns flammable fluid components affected by wheels-up landings. The purpose of this AC is to provide some guidelines and installation practices which, if used, will comply with the intent of the applicable rule. The draft of the AC has been finalized and an NPRM is being prepared for the Federal Register requesting public comment on the draft. The Federal Register announcement should be made by the fall of 1984. ††

AC's Continued...

AC 20-88-XX Study of Powerplant Instrument Markings is a revision to AC 20-88-XX, dated December 11, 1973. Included are revised guidelines on the marking of aircraft powerplant instruments and electronic displays. Additional information has been added regarding cathode ray tube (CRT) displays, automatic takeoff reverse thrust ratings, and conditionally restricted operating ranges. An NPRM requesting public comment on this AC was published in the Federal Register on January 13, 1983 (48 FR 1583). The comment period was extended on February 3, 1983 (48 FR 4948) to March 29, 1983. After a thorough review of all comments received, the AC is being finalized. Issuance of this AC is expected before the end of 1984.††

LISA BUCHANAN
Aircraft Modification Section
Western ACO



JACK ACAMPORA, TERESA BUTLER
Propulsion Section, Western ACO

AC 25.994-XX Water Ingestion Testing concerns the ingestion of water from the runway/taxiway surface into the airspeed system, the engine, and essential auxiliary power unit air inlet ducts of turbine engine powered airplanes. The NPRM was published in the Federal Register on August 1, 1984. The closing date for comments: October 1, 1984. ††

AC 140-6C, The Development and Use of Major Repair Data Under Provisions of Special Federal Aviation Regulation (SFAR) No. 36, dated February 3, was updated to advise the aviation community that SFAR 36 has been extended for an additional 5 years. It provides information related to the issuance of an authorization to allow repair stations, air carriers, and air taxi/commercial operators of large aircraft to develop and use major repair data not specifically approved by the Administrator in accordance with the requirements of SFAR 36. ††

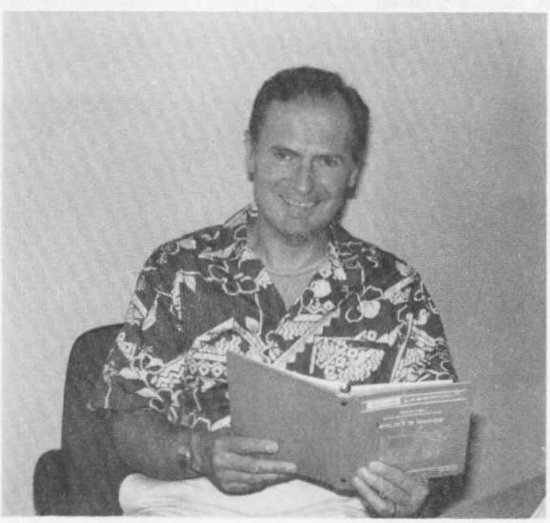
AC 91-61, A Hazard in Aerobatics: Effects of G-Forces on Pilots, issued February 28, provides background information on gravitational effects (G's), how they affect the human body, and their role in safe flying. It includes suggestions for avoiding problems caused by accelerations encountered in aerobatic maneuvers. ††

AC's Continued...

AC 20-107A, Composite Aircraft Structure, dated April 25, updates the structural guidance material contained in the AC to reflect technology advances. It represents a U.S./European agreement on guidance material that may be used in showing compliance with the appropriate certification requirements of civil composite aircraft structure. (AWS-103)††

AC 20-110B, Index of Aviation Technical Standard Orders, dated April 12, describes the public procedures the FAA will use to develop and issue TSO's, and presents an index of current TSO's. It also provides a listing of TSO's being proposed for which a notice of availability has been published in the Federal Register; and a listing of TSO's being developed by the FAA. ††

AC 20-42C, Hand Fire Extinguishers for Use in Aircraft, dated March 7, was updated due to recent advancements in fire fighting technology and the proliferation of approved hand-held extinguisher models containing Halon 1211, 1301, and combinations of the two. The information contained in the AC is considered acceptable for use by the owners/operators of small aircraft. (AWS-340)††



PAUL WELLS
Systems & Equipment
Western ACO

AC 120-28C, Criteria for Approval of Category III Landing Weather Minima, issued March 9, sets forth an acceptable means, but not the only means, for obtaining approval of Category IIIa or Category IIIb landing weather minima and the installation approval of the associated airborne systems. (AFO-210)††

AC 43-9B, Maintenance Records, dated January 9, 1984, was updated to discuss maintenance record requirements under Federal Aviation Regulations Part 43, Sections 43.9, 43.11, Part 91, Section 91.173, and the related responsibilities of owners, operators, and persons performing maintenance, preventive maintenance, and alterations. ††

AC 61-93, Replacing the Flight Test Guides with Practical Test Standards, issued March 27, announces the cancellation of the flight test guide advisory circulars which will be replaced by a new system of practical test standards, and explains the concept and format of these standards. (AVN-130)††

TECHNICAL STANDARD ORDERS (TSO)

The Office of Airworthiness (AWS-100) recently issued the following TSO's to reflect technological advances in aeronautics:

- TSO-C36d, ILS Localizer Receiving Equipment
- TSO-C56a, Engine-Driven Direct Current Generators/Starter-Generators
- TSO-C70a, Liferafts (Reversible and Non-reversible)
- TSO-102, Airborne Radar Approach and Beacon Systems for Helicopters
- TSO-C103, Continuous Flow Oxygen Mask Assembly (For Non-Transport Category Aircraft)††

FAA recently published Notices in the Federal Register announcing the availability of proposed TSO's for public comment. They are TSO-C109, Airborne Navigation Data Storage System; and TSO-C41d, Airborne Automatic Direction Finding (ADF) Equipment. ††

NOTICES AND DIRECTIVES

Order 8340.1A, Change 75, Maintenance Bulletins, issued January 6, transmits Maintenance Bulletin No. 25-42, Corrosive Properties of Flame Retardant Solutions. This bulletin alerts field personnel of the potential corrosive properties of flame retardant solutions used on seat covers and cockpit carpeting. ††

Order 8340.1A, Change 76, Maintenance Bulletins, issued January 18 transmits Maintenance Bulletin No. 53-7, Fluid Lines Installed in Powerplant Designated Fire Zones. This bulletin alerts field personnel that fluid lines installed in some powerplant designated fire zones do not meet the basic fire resistant and certification requirements. ††

Notice 8000.247, Interim Designated Airworthiness Representatives Qualification Criteria, Selection, and Appointment Procedures, issued March 21, 1984, extends until March 1, 1985, the provisions of Notice 8000.233 ("Interim Qualification Criteria, Selection, and Appointment Procedures for Designated Airworthiness Representatives, DAR," originally issued on March 30, 1983). It also incorporates the provisions of Notice 8000.240 ("DAR Program Adjustments," issued October 13, 1983). The interim criteria contained in the Notice is currently being revised to clarify the procedures for the appointment of organizations as DAR's. ††

Notice 8130.42, Issuance of Export Airworthiness Approvals for Class II and III Products, issued January 5, provides guidance to assure uniformity in administering FAR Part 21, Subpart L, so that applicants for export airworthiness approvals are treated fairly and equally; and cancels Notice 8130.41 issued last October on the same subject. ††

Revised **FAA** Forms

FAA Form 8130-1, Application for Export Certificate of Airworthiness, was inadvertently printed with a typographical error in Part I, Item 8. Copies of this form (issued 8/83) containing the error were put in stock at the FAA Depot. FAA Form 8130-1 was subsequently revised in 2/84 to correct the typographical error and to make further adjustments to the form. Copies of the revised form, which supersedes the previous editions, will be distributed to appropriate FAA offices, and will be available from the FAA Depot. The national stock number is 0052-00-024-9003, and the unit of issue is "sheet." ††

FAA Form 8130-6, Application for Airworthiness Certificate, was revised in December 1983 and supersedes the previous edition. Copies of the form will be available from the FAA Depot through normal distribution channels. The national stock number is 0052-00-024-7003, and the unit of issue is "sheet." ††

HERB PETERS
Systems & Equipment
Western ACO

General News

FAA'S DAY IN COURT

The U.S. Supreme Court has ruled that FAA may not be sued by airlines or private citizens for any failure to uncover safety defects in the aircraft certification process, even if those defects result in aviation accidents.

The FAA case arose from the crashes of a Varig Airlines flight in 1973 and a Catlina-Vegas Airlines flight in 1968. Both accidents resulted from in-flight fires.

The Court's unanimous decision, written by Chief Justice Warren E. Burger, overturned a ruling by the 9th U.S. Circuit Court of Appeals in California which permitted lawsuits against the agency for damages from the crashes. Burger noted, "The FAA has a statutory duty to promote safety, not to insure it." He went on to state that only aircraft manufacturers and operators can guarantee safety and that they are responsible for any failures.

Legal observers have predicted that this case may serve as a major precedent because many other regulatory agencies responsible for areas such as occupational safety, nuclear power, and medicine could, by inference from the FAA decision, also be deemed immune from damage suits.

James S. Dillman, FAA's Assistant Chief Counsel for Litigation, sums up the case: "The rulings were based upon what is called the discretionary function exception to the Federal Tort Claims Act and they apply only to the FAA's certification process. These rulings would not apply to cases involving operational negligence as in the typical air traffic control or weather related case." ††

SMOKE DETECTORS PROPOSED FOR AIRLINERS

FAA has issued a Notice of Proposed Rulemaking that would require smoke detectors in the galleys and lavatories of large airliners. Under the proposed regulations, fire extinguishers in lavatories and increased number of cabin extinguishers also would be mandatory.

Smoke detectors would warn pilots and flight attendants of fires that might otherwise go undetected. Aircraft galleys have the highest potential for flame, smoke, and overheated conditions. Lavatories pose less of a fire threat but were included because they are out of view and fires started in them could go undetected for long periods.

The proposal for automatic fire extinguishers for lavatory trash receptacles was based on inspections that followed a fatal fire on an Air Canada jet last summer which showed many receptacles lose their fire-containing capability through normal wear and tear.

Also under the proposed rule the number of hand-held fire extinguishers would be increased from the maximum of two required now to as many as eight, depending on the number of passenger seats. ††

JIM BUGBEE, Flight Test, Western ACO

General News Continued...

PRINCIPAL ADVISOR FOR MANUFACTURING INSPECTION

Wing Chin, Manager of the Manufacturing Inspection Branch, ANM-180S, Seattle ACO, is the principal advisor for all manufacturing inspection issues for the Transport Airplane Certification Directorate.

Mr. Chin is responsible for the standardization of operating policies and procedures for transport airplane production certification, type design quality assurance, and airworthiness. Examples of Mr. Chin's responsibilities are standardization of Quality Assurance Safety Analysis Review (QASAR) participation to cover Parts Manufacture Approvals (PMA), Technical Standard Orders (TSO), Production Certificates (PC), and Approved Production Inspection Systems (APIS) holders, and coordination of planning schedules to assure uniformity of operations throughout the Transport Directorate.

This responsibility includes assuring that Quality Assurance Handbooks are current with respect to orders, notices, advisory circulars, FAR's, and compliance and enforcement actions as they apply to transport category airplanes. It also includes developing and recommending Directorate policy for implementation of rules, orders, and procedures as they relate to certification quality assurance for transport category airplanes.

Additionally, Mr. Chin will serve as the point-of-contact for all transport airplane certification quality assurance issues such as the review of draft advisory circulars, policies, and procedures. He will also provide assistance and guidance in all areas of a controversial nature which relate to quality control and manufacturing problems for transport airplanes. ††

IN MEMORIAM

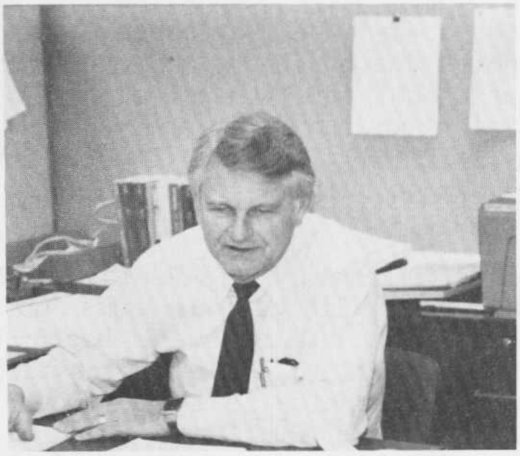
Max Peacock, an Aerospace Engineer with the Regulations and Policy Office, Aircraft Certification Division, passed away on the evening of June 25th, after suffering an apparent heart attack. He was in Orlando, Florida, at the time, participating in the International Aerospace Conference on Lightning and Static Electricity. Max was 49.

Max began working for the FAA in 1977 in Atlanta, and worked both as an Avionics Inspector and an Aerospace Engineer. Before joining the FAA he worked for 15 years for the Lockheed-Georgia Company, primarily in the design, testing, and certification of avionics systems. He held a Bachelor's degree in Electrical Engineering from Georgia Institute of Technology.

Max had an interest in aviation which extended beyond the work place, and he was an enthusiastic weekend pilot. He will be remembered for both his technical expertise and easy-going good nature.

He is survived by his wife, Ann, who is the Services Section Supervisor in the Logistics Division in the FAA, Northwest Mountain Region; his son, Charles, 29; and his daughters, Julia 24, and Leanne, 17.

††



MAX

General News Continued...

DESIGNEE TRAINING COURSE SCHEDULED

The Aviation Standards National Field Office in Oklahoma City has completed work on a Designee Indoctrination Course and is preparing to present the course at various locations around the country. The purpose of the course is to standardize training of FAA Designees, e.g., Designated Manufacturing Inspection Representatives (DMIR), Designated Airworthiness Representatives (DAR), representatives of repair stations and manufacturers with a Designated Alteration Station (DAS), and representatives of manufacturers with Delegation Option Authorization (DOA).

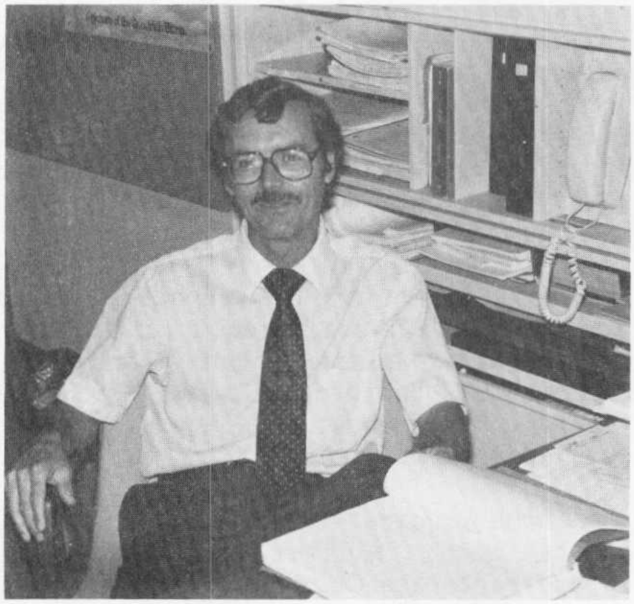
The training course will be three days (20 hours) long and is designed to familiarize Designees with FAA administrative procedures, methods, and practices in order to ensure greater standardization. The following material will be covered through slide lectures, video presentations, and workshop sessions:

- o Publications Applicable to Designees, c.g., Federal Aviation Regulations, Advisory Circulars, Directives, and Orders.
- o Designee Authority and Responsibility.
- o Type Certification Conformity.
- o Compliance and Conformity Data.
- o Airworthiness Certification and Related Approvals.
- o Export Airworthiness Certification.
- o Agency Forms and Records.

The first training session was held in Oklahoma City at the end of July. The complete schedule of classes, which extends into 1986, will be published in the Federal Register. In adddition, Designees will be notified by their local Aircraft Certification Office by letter 120 days prior to the start date of the class being held nearest to them. To assist you in planning your schedule, we have obtained the following tentative schedule of class start dates for the geographic area covered by the Transport Directorate:

Seattle, WA - October 29, 1984
Pasadena, CA - January 19, 1985
Phoenix, AZ - February 25, 1985
Van Nuys, CA - April 8, 1985
Denver, CO - June 3, 1985
Inglewood, CA - December 9, 1985
Long Beach, CA - March 17, 1986

††



BOB STACHO
Systems & Equipment, Western ACO

REORGANIZATION OF HONOLULU ACO ACTIVITIES

The FAA closed the Honolulu Aircraft Certification Office, ANM-170H, on May 1, 1984. The Honolulu ACO's responsibility had included all aircraft certification activities in the Far East, Southeast Asia, and the Pacific Basin. These functions have now been transferred to the Western Aircraft Certification Office, ANM-170W. Gary Nakagawa, formerly the Honolulu ACO Manager, was reassigned to ANM-170W and is now the Assistant Manager of the Western ACO, which is located at 15000 Aviation Boulevard, Hawthorne, California. Any mail or inquiries about the former Honolulu ACO activities should be directed to P.O. Box 92007, Worldway Postal Center, Los Angeles, CA 90009. ††

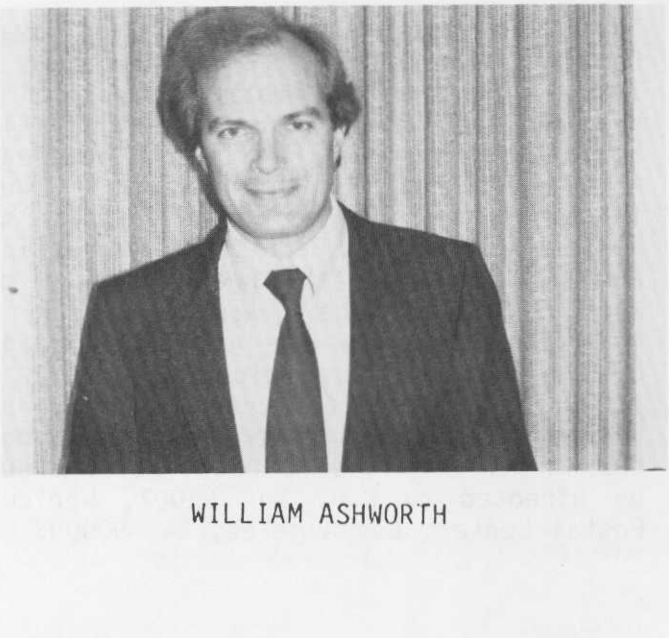
General News Continued...

MANAGEMENT DEVELOPMENT PROGRAM

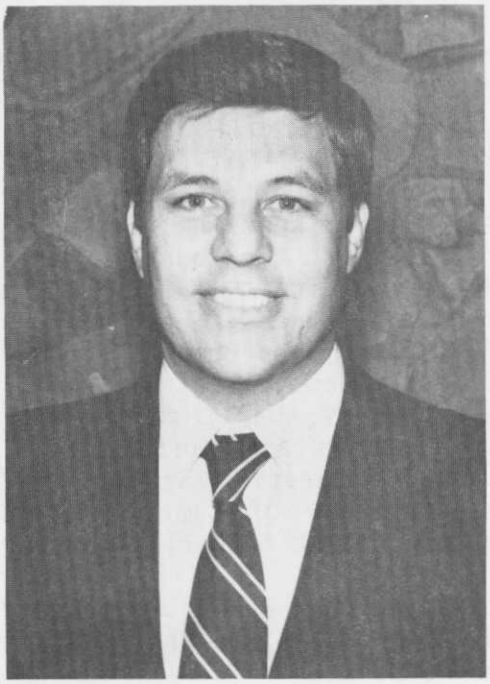
In January 1984, the Aircraft Certification Division inaugurated its Management Development Program. The purpose of the program is to train a pool of highly qualified applicants for future supervisory and managerial vacancies within the Division. The employees are selected for the program on a competitive basis and exposed to a wide range of training and development experiences designed to prepare them for managerial jobs. The training and development experiences include personnel administration, human relations skills, fiscal administration, and Equal Employment Opportunity.

The applicants for the program were all extremely well-qualified. The final selections were made based on variety of experience, performance ratings, supervisory recommendations, and personal development.

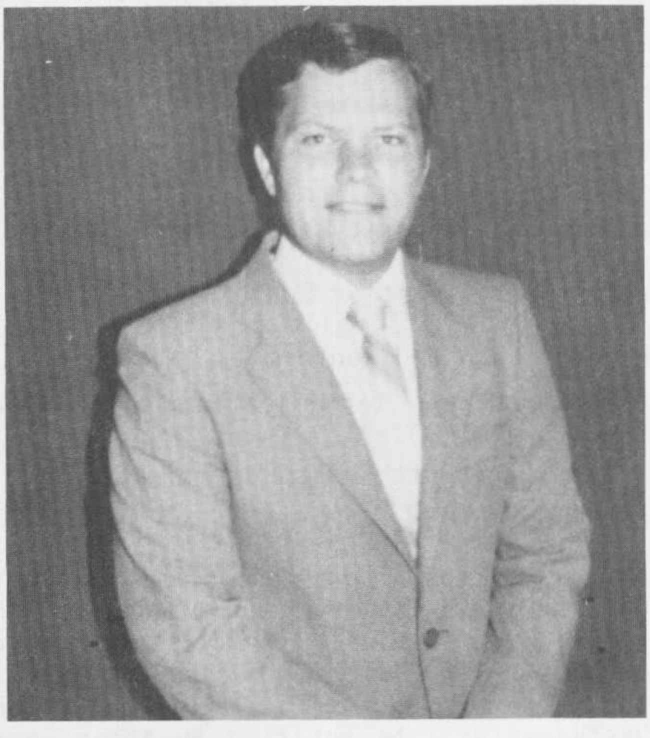
The three candidates selected for the 1984 program were: William Ashworth, Manager, Interdirectorate Certification Branch, Los Angeles ACO; Dennis Piotrowski, Aviation Safety Inspector (Manufacturing), Van Nuys Manufacturing Inspection District Office; and Donald Gonder, Aerospace Engineer, Airframe Branch, Seattle ACO. ††



WILLIAM ASHWORTH



DENNIS PIOTROWSKI



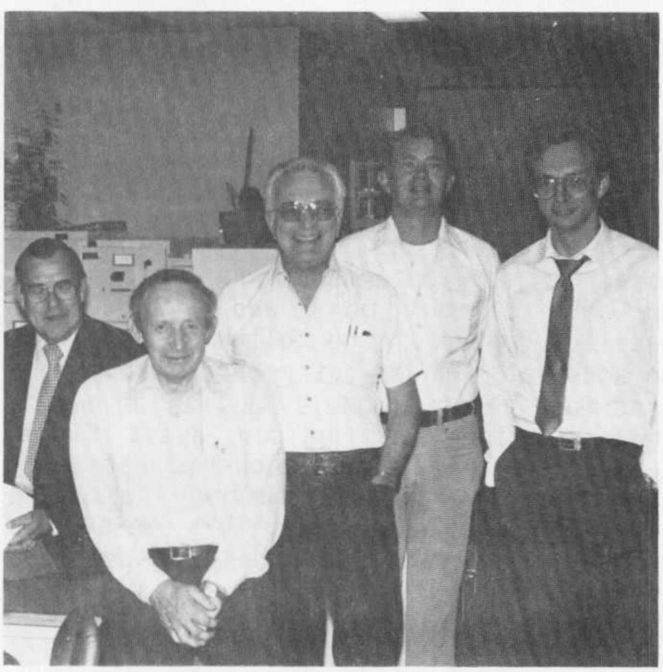
DONALD GONDER

General News Continued...

SF-340 RECEIVES ITS TYPE CERTIFICATE

The SAAB/Fairchild 340 commuter aircraft received its U.S. Type Certificate on June 29, in ceremonies held in Linkoping, Sweden. The application for a Type Certificate for the SF-340, a joint venture between SAAB in Sweden and Fairchild in the U.S., was made in March 1980. The first flight of the prototype was January 1983. The certification program for the SF-340 was carried out by the Foreign Certification Branch of the Seattle ACO under the provisions of FAR 21.29.

The SF-340 is a low wing monoplane equipped with two GE CTT-5 turboprop engines. With a maximum weight of 26,000 pounds, it is pressurized and can carry up to 35 passengers. Comair will be the first U.S. carrier to operate the SF-340 in the United States. †† (H.N. Wantiez, Aerospace Engineer, Foreign Certification Branch, Seattle ACO)



l. to r. M. RAMMELSBERG, J. KRUEGER, R. BRANDT, A. STRICKFADEN, J. JODELE, Aircraft Modification, Western ACO

The EMB-120 "Brasilia"

FAA CERTIFICATION ASSISTANCE VISIT TO BRAZIL

In February, a team of 7 FAA certification engineers and one airworthiness specialist spent two weeks in Sao Jose dos Campos, Brazil, to assist the Brazilian Civil Aviation Organization in development of type certification capability of transport category airplanes. This assistance was the first of its type and was funded under a reimbursable agreement. Members of the FAA team were: Jim Ashley and Fred Lee - Los Angeles ACO; Jim Haynes and Ray Stoer - Regulations and Policy Office; Jerry Mack - Technical Support Group (Team Leader); Gail Dow - Seattle Aircraft Evaluation Group; Pat Perrotta - New York ACO; and Dave West - Atlanta ACO.

The FAA team members worked with their Brazilian counterparts on the intent, interpretation, and application of Federal Aviation Regulations Part 25 - Airworthiness Standards for Transport Category Airplanes, and discussed various methods of substantiation and compliance to these standards.

The Brazilian government's request for this assistance was prompted by the development of a light twin turboprop transport airplane, the EMB-120 "Brasilia," by the Brazilian aircraft manufacturer, Embraer. ††

General News Continued...

HIGH ALTITUDE SPECIAL CONDITIONS

FAR Part 25 transports, under new type certificate application, must meet high altitude special conditions or equivalent criteria for operation above 40,000 feet for large transports and 41,000 feet for executive jets. High altitude executive jet special conditions were issued for the Mystere Falcon 200 (49 FR 7219), and a Notice of Proposed Rulemaking (49 FR 9906) was issued for the Israeli 1125. A project is underway to consolidate these special conditions and the large transport criteria into FAR Part 25. †† (Mark Quam, Aerospace Engineer, Regulations and Policy Office Staff)

COMMUTER CATEGORY AIRPLANES

The FAA issued a Notice of Proposed Rulemaking (NPRM) proposing to amend Parts 21, 23, 36, 91, and 135 of the Federal Aviation Regulations (FAR) to adopt certification procedures, airworthiness and noise standards, and operating rules for an additional category of Propeller-driven, multi-engine airplanes, designated as the "Commuter Category."

Amendment of Part 21 is proposed to allow certification of commuter category airplanes by the same procedures as other aircraft. Amendment of Part 23 is proposed to include additional airworthiness standards for airplanes with a maximum seating capacity, excluding pilot seats, of 19 or less, a maximum certificated takeoff weight of 19,000 pounds or less, and which comply wth the International Civil Aviation Organization (ICAO) Annex 8, Part III, standards. Amendment of Part 36 is proposed to require commuter category airplanes to be certificated to the noise standards applicable to small, propeller-driven airplanes.

In addition to the proposals related to certification procedures, and airworthiness and noise standards, the FAA is proposing amendments to the operating rules (Parts 91 and 135) applicable to the commuter category airplane.

The proposed amendments recognize and allow operation of the commuter category airplane in essentially the same manner as an airplane certificated to the airworthiness standards of Special Federal Aviation Regulation (SFAR) 41. SFAR 41 contained interim airworthiness standards for propeller-driven, multi-engine airplanes similar to that proposed for the commuter category. This regulation expired on September 13, 1983. ††

MARDY FRANKS	JACKIE MELIN
Technical Support	Airframe Section
Western ACO	Western ACO

PART 36 REFERENCE FLIGHT PROFILES - FOUR ENGINE AIRPLANE QUIET NACELLE PROGRAMS

The Regulations and Policy Office has been asked to develop performance information for the various DC-8 and B-707 Quiet Nacelle programs. The following describes an acceptable short-cut method that may be used for specific models in lieu of engine thrust calibration and subsequent flight tests to determine the acoustic reference day (see defination below) airplane performance parameters. This method is offered as guidance and does not preclude the use of other approved analysis methods and/or flight test procedures.

Appendix A of FAR Part 36 [Section A36.11(a)] requires that the acoustic reference day (sea level airport at ISA + 10°C) takeoff and approach performance

General News Continued...

information be derived from FAA approved data. It is acceptable to base the airplane performance on either minimum or average engine thrust. As the applicant, the airplane manufacturer would normally derive the required performance data using FAA approved aerodynamic and propulsion data obtained from tests and analysis. An STC applicant who doesn't have access to previously approved performance data would usually develop the necessary data by conducting flight tests with calibrated engines. However, for several DC-8 and B-707 models, Part 36 performance data exist and are documented in the FAA Aircraft Noise Definition Reports (see below). This information is an acceptable basis for defining the Part 36 reference conditions for the unmodified airplane and is representative of average engine performance for the respective engines.

To assess the change, if any, in airplane performance of the modified airplane, the following steps are recommended:

1. Calibrate the flight test engine's Engine Pressure Ratio (EPR) measurement systems.

2. Conduct back-to-back flight tests of the unmodified and modified (quiet nacelle) configurations at flight conditions representative of the Part 36 reference conditions in order to obtain airplane performance comparison data. These tests should be conducted with the same engines in the same relative positions for both configurations.

3. Adjust the baseline airplane Part 36 performance (from referenced documents) to account for changes in engine and/or airplane performance between the unmodified and modified (quiet nacelle) configurations. These corrections would account for any change in the EPR required for the landing approach flight profile and the thrust cutback portion of the takeoff flight profile, as well as changes in the takeoff field length and climb gradient at takeoff power.

The adjusted (if required) reference day engine and airplane performance can then be used as the reference parameters which determine the noise levels from the modified airplane's noise test data base.

The following FAA documents contain the Part 36 airplane performance parameters for certain DC-8 and B-707 models which constitute the basis for the short-cut analysis method. These documents have been supplied to the ACO's and should be made available to applicants who desire the information.

AIRCRAFT NOISE DEFINITION REPORTS:

B-707 - Report No. FAA-EQ-73-7.2
DC-8 - Report No. FAA-EQ-73-5

††

COMPLIANCE OF SMALL TRANSPORT CATEGORY AIRPLANES WITH FAR 25.305(d), AND APPENDIX 'G' CONTINUOUS TURBULENCE

You should be aware that differences in load level exist between the design envelope and the mission analysis load methods when applied to the same airplane. Mission analysis may show higher loads than either the rigid 25-chord gust condition or the design envelope Power Spectral Density (PSD) condition. It is expected that the mission analysis method would produce higher loads on airplanes designed to operate below 28,000 feet for a relatively high percentage of flights.

Compliance with the continuous turbulence requirements of FAR 25.305(d) allows use of either the design envelope method of paragraph (b) of Appendix G or by the mission analysis method of paragraph (c) in conjunction with the supplementary design envelope analysis of paragraph (d). Clearly, the applicant may choose the method of compliance.

We are presently reviewing Appendix G to determine if $U\sigma$ should be revised for both large and small airplanes. A variable $U\sigma$ versus approved operating altitudes or versus airplane mass parameter may be appropriate methods of aligning the design envelope method with the mission analysis method for all transport airplanes.

General News Continued...

Until these issues are resolved, the manufacturers of light transport airplanes should be encouraged to voluntarily use the mission analysis method since there is no mandated regulatory requirement. If the applicant insists on using the design envelope method, he/she should use a $U\sigma$ of 85 FPS. ††

ISSUANCE OF TYPE CERTIFICATES PRIOR TO COMPLETION OF DAMAGE TOLERANCE TESTING (FAR 25.571)

As a result of inquiries by other certification directorates, we offer this guidance relative to the certification of structures to the Damage Tolerance (DT) requirements of FAR 25.571.

It is not always possible for an applicant to complete all DT testing prior to certification, due to the amount of testing required for certification. In the past, for example, we have issued Type Certificates (TC) prior to completion of fatigue tests on life-limited parts. This can be done when sufficient testing has been completed to assure fatigue damage would not be a problem when a conservative inspection program was required. We consider it acceptable to issued a TC with some damage tolerance data outstanding, if:

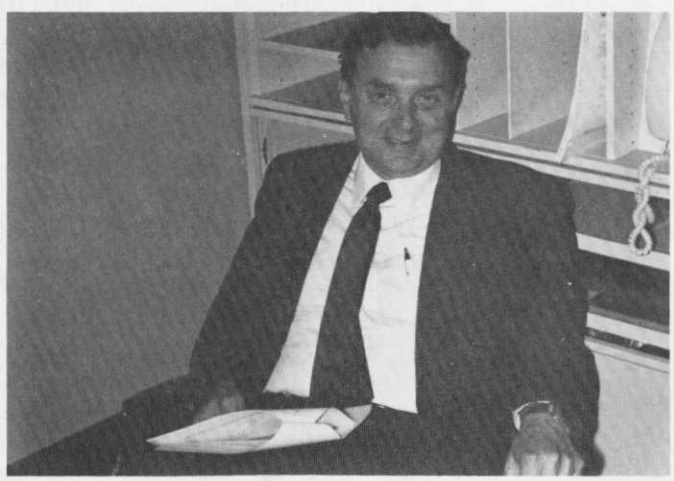
1. All analysis is complete and has been reviewed by the FAA.
2. The applicant has done sufficient DT testing to assure that fatigue will not be a problem under a conservative inspection program.
3. The design is conventional with no unusual design features, and operating stresses are within the range expected for such structure.
4. The applicant is committed to a reasonable completion and submittal schedule acceptable to the FAA.
5. Corrosion protection of the structure is found adequate.
6. The discrete source damage evaluation is complete and approved. ††

MORE ON PRESSURIZED CABIN LOADS - APPLICATION OF FAR 25.365(e)

In our December 16, 1983, Designee Newsletter, we included an article on page 11 titled, "Pressurized Cabin Loads - FAR 25.365 (e)." The article gave the correct interpretation of § 25.365 (e)(2) relative to hole sizes for passenger and cargo compartments, but this interpretation should not be applied to crew compartments.

FAR 25.365(e) reads that the "cabin must be designed to withstand the effects of a sudden release of pressure through an opening in any compartment at any approved operating altitude resulting from any of the following conditions...;" subparagraph 25.365(e)(2), however, reads: "...an opening in any passenger or cargo compartment..."

Venting is required by § 25.365(e)(2) for hole locations in the passenger and cargo compartments only. The applicant is required, however, to provide venting to accommodate hole sizes associated with any failure condition not shown to be extremely improbable in all compartments, [see FAR 25.365(e)(3)]. Service experience has shown that the loss of a windshield or window is not extremely remote. As a minimum, the crew compartment should be designed for a missing windshield or window at maximum regulated differential cabin pressure. ††



DON DIRIAN
Airframe Section, Western ACO

General News Continued...

l. to r. SAM GROBER, HENRIETTA GUEBLE, DAN SLONE, Flight Test, Western ACO

STANDARDS FOR TRANSPORT AIRPLANE FUEL QUANTITY SYSTEM ACCURACY

The Transport Directorate Regulations and Policy Office recently reviewed the issue of fuel quantity indicator accuracy requirements. The following information provides guidance on the application of current regulatory requirements and certification practices.

Section 25.1337(b) requires that each fuel quantity indicator be calibrated to read "zero" during level flight at the unusable fuel quantity. The FAA has never considered this regulation to require absolute accuracy of the fuel quantity gauge at "zero." Basically, instead of literal compliance, the system should perform its intended function, provide an equivalent level of safety, and not exhibit unsafe features or characteristics. A reasonable degree of accuracy, as presented below, is generally adequate.

The Technical Standard Order (TSO) requirement for fuel quantity instruments (TSO-C55) refers to the Society of Automotive Engineers (SAE) Aeronautical Standard AS-4058, "Fuel and Oil Quantity Instruments," dated July 15, 1958. This standard specifies that the error at any point in the scale shall not exceed 3% of full scale indications.

However, it is the current practice of some ACO's to use as guidance the information in Military Specification MIL-G-8798, "General Specification for Integrally Lighted, Non-vacuum Tube, Capacitance Type Fuel Quantity Gauge System." This document specifies that complete gauge system error at room temperature shall not exceed 2.0% of the indication plus 1.0% of the full scale indication (paragraph 4.5.8). MIL-G-8798 has been superseded by MIL-G-26988C, but the accuracy requirements for Class I systems (non-attitude corrected for older designed airplanes) remain the same (paragraph 4.6.8.). These specifications are compatible with the TSO requirements and generally provide satisfactory criteria for evaluating fuel quantity gauge accuracy. Other ACO's have adopted certain constant accuracy tolerances, based on a manufacturer's recommended criteria, that are within the "Mil. Spec." requirements.

Based on investigation, this office recommends that the fuel quantity gauge accuracy requirements that are set forth in Military Specification MIL-G-26988C for the complete gauge system at room temperature (2.0% of indication plus 1.0% full scale) be used as guidelines for fuel systems on transport category airplanes using capacitance type fuel tank probes. ††

EXPORT AIRWORTHINESS APPROVALS

Historically, export airworthiness approvals of Class II and III products and parts have caused consternation among FAA Inspectors and Designees. Recent policy in the form of General Notice (GENOT) 8130.42, dated January 5, 1984, has been distributed to clear the air on this subject.

General News Continued...

Class I products are complete aircraft, engines, or propellers. Class II products are major components of Class I products, such as: wings, empennage assemblies, rotor blades, engine fan blades, or parts whose failure would jeopardize the safety of the product. This classification would also include Technical Standard Order (TSO) appliances approved under the "C" series [FAR Part 21.321(b)(2)]. Class III products are any part or components that are not Class I or II. The key in determining the difference between a Class II or III product is the phrase "jeopardize the safety."

The only persons authorized to issue export airworthiness approvals for Class III parts are Designated Manufacturing Inspection Representatives (DMIR) employed by the holder of an FAA production approval.

Export Airworthiness Approvals should not be issued by any FAA Inspector or Designee for any Class II or III product unless the applicant shows, and the FAA finds, compliance with FAR Part 21, Subpart L.

All products for which Export Airworthiness Approvals have been requested must be shown by the applicant, and found by the FAA, to conform to the approved design data, be in condition for safe operation, and meet the special requirements of the importing country. This is necessary to comply with the intent of bilateral airworthiness agreements. Such determination can readily be made when the products are new and are being exported by the FAA production approval holder of the particular product.

Bilateral airworthiness agreements do not differentiate between new or used products. Used products may also be eligible for airworthiness approvals when the applicant can show, and the FAA finds, that the product in its entirety (1) meets its approved design data, (2) is in a condition for safe operation, and (3) meets the special requirements of the importing country. This determination must also be made for newly overhauled products since bilateral airworthiness agreements do not presently provide for mutual acceptance of any maintenance activity. In these instances it is usually more difficult to show and find conformity to the approved design data and condition for safe operation. An applicant could show compliance with these requirements by one of the following three methods:

1. Having documentary traceability to the approved manufacturer of the product through original invoices or other documents that include the product serial number or equivalent.

2. Making a conformity inspection of the product to the approved design data. However, it would be extremely difficult, if not impossible in most cases, for the applicant to show conformity to the material, special process, nondestructive inspection requirements, etc., once the product has been shipped from the approved manufacturer's facility.

3. Showing that the products were originally produced and accepted under the FAA production approval and have remained in or returned to their approved design configuration; or showing that they were properly maintained, including any overhaul, under a system acceptable to the FAA, such as a repair station, air carrier, etc. This must be substantiated by complete historical records or by evidence of the product being controlled through an FAA approved system, such as an air carrier quality control system which controls the origin and subsequent maintenance accomplished. An airworthiness maintenance release tag alone is not considered to be satisfactory substantiation that the product meets its approved design data and is in condition for safe operation.

Prior to the issuance of an export airworthiness approval, when a part is not new or newly overhauled or does not meet other pertinent requirements of the FAR including special requirements of the importing country, the applicant must

General News Continued...

obtain acceptance in writing from the Foreign Civil Airworthiness Authority (FCAA) for the specific deviations. The specific deviations and the FCAA acceptance document should be referenced for the export approval.

A certification of the origin of a Class II product from an exporter (including distributors) without documentary traceability of that product to the approved manufacturer is not acceptable in showing conformity to the approved design data. The packaging of the product is not an acceptable means of showing traceability to the approved manufacturer. A product which is in a box or carton with markings similar to those used by the production approval holder does not constitute evidence of origin. ††

MEANING OF CERTAIN ASPECTS OF ADVISORY CIRCULAR AC 25.1309-1, DATED 9/7/82

[Editor's Note: As a result of an FAA/Industry "critique" of FAR 25.1309 and the Advisory Circular, the Aerospace Industries Association (AIA) volunteered to form a working group to review AC 25.1309-1 and recommend changes to the FAA. That working group has met twice and is nearing completion of its efforts. Once AIA has submitted its recommendation, the FAA will make the revised AC available for public comment through the Federal Register publication process.]

We direct your attention to the following paragraphs of AC 25.1309-1:

> **Paragraph 3.c.,** "A finding of compliance with the requirements of FAR 25.1309 is based on the technical judgment of FAA pilots and engineers," and "These analytical tools are intended to supplement, but not replace, the judgment of the FAA certification personnel."
>
> **Paragraph 5.n.,** NOTES: "(a) If a quantitative analysis is used to help show compliance with the Federal Aviation Regulations..." (underlining added).

The underlined words and phrases emphasize the intent of the Advisory Circular, specifically that quantitative analyses are to be used only as a supplement to, and not a replacement for, sound engineering judgment. Excessive reliance on quantitative analyses is not appropriate and is never a substitute for intelligent, logical consideration of a system, its criticality and possible failure modes, the presence of other operationally redundant similar or dissimilar systems, operational needs and considerations, etc. It is anticipated that quantitative analyses, when required, will be used to support engineering judgment only for critical systems and perhaps certain highly-essential systems.

††

[Submitted by Robert F. Hall, Supervisory Aerospace Engineer; Avionics, Electrical and Instruments Systems Section, Systems and Equipment Branch, Los Angeles ACO]

FRANK CARDONE, RAINEE GAUARDO
Systems & Equipment, Western ACO

General News Continued...

CHILD SAFETY SEATS IN AIRCRAFT

The FAA Atlanta, Chicago, and Western Aircraft Certification Offices have approved the following safety seats for use in the aircraft:

Pride-Trimble Models 820 and 830 Pride Ride.

Cosco Models 78 Safe-T-Seat, 81 Safe-T-Shield, 181 Luxury Safe-T-Shield, 83 Travel Hi-Lo, 178 Luxury Safe-T-Seat, 183 and 283 Deluxe Travel Hi-Lo, 313 Safe and Easy, 323 and 423 Safe and Snug, 378 and 478 Safe-T-Mate, 383 and 483 Deluxe High Back Travel Hi-Lo, and 582 and 682 First Ride.

Century Models 4100, 4200, and 4300 Car Seat, and 4500 Infant Love Seat.

Strolee Models 599 Wee Care, 602 and 604 Wee Care Booster Seat, and 612 and 618 Car Seat.

Some of the above FAA-approved child safety seats may not carry the FAA "seal of approval" but they are still acceptable for use in aircraft provided they have labels indicating conformance to all applicable Federal Motor Vehicle Safety Standards. (AWS-100)††

JIM WANG
Airframe Section
Western ACO

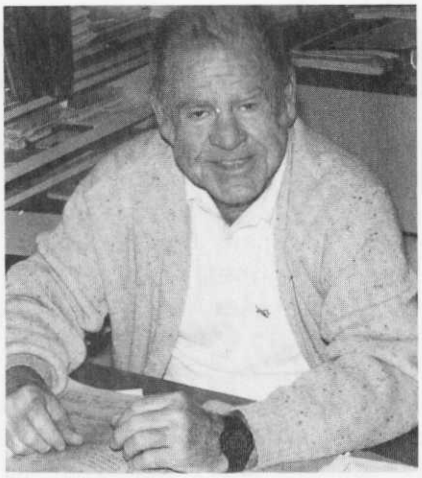
HANK BURWASH, JOHN EHRET
Propulsion Section, Western ACO

AGE 60 PROPOSALS WITHDRAWN

The FAA has withdrawn Notice No. 82-10, "Flight Crewmembers; Limitations on Use of Service," commonly referred to as the "Age 60 Rule." The withdrawal leaves intact the current Part 121 rule which prohibits any person who has attained the age of 60 years from serving as a required pilot flight crewmember. The notice proposed a data collection program that might support a determination as to whether persons age 60 or older could safely serve as pilots of airplanes operated under Part 121. The notice also requested information on the possibility of establishing age limitations for required flight engineers employed by Part 121 air carriers.

The "Age 60 Rule" withdrawal notice states that the FAA decision is based on the absence of validly selective tests that could provide a means for collecting quantitative medical and performance data on senior airline pilots under conditions of actual operational stress and fatigue. As to establishing age limitations for flight engineers, the notice states that available safety data are not sufficient to support imposing a mandatory retirement age on flight engineers. However, air carrier operations inspectors are instructed to report examples of any safety problems created by the presence of flight engineers age 60 or more who are serving on airplanes being operated under Part 121. Copies of the March 30 notice of withdrawal may be obtained by calling (202) 472-4621. (AFO-200)††

General News Continued...



BILL DALEY, Airframe Section, Western ACO

EXTENDED RANGE TWIN ENGINE OPERATION

Over the last 5 to 8 years the preponderance of new large transport airplane programs have dealt with twin engine aircraft. Some of these airplanes have payload-range performance characteristics that are equal to the early four-engine jet transport airplanes. This capability, coupled with the outstanding economics of twin engines, has been an incentive to certify those airplanes for long range, over-water flights. Included in this category are the longer range versions of the B767 and A300 series aircraft, and others will certainly be added in time.

Over-water operations by twin engine aircraft are currently permitted by the FAA, provided the flight is never more than 60 minutes flying time at the one-engine-out cruise speed from a suitable airport. This is generally about 400 nautical miles. The International Civil Aviation Organization (ICAO) has a similar standard which addresses the over-water flights of foreign operators not constrained by FAR 121. However, the ICAO rule allows up to 90 minutes flying time at two engine cruising speed (about 120 minutes at single engine cruise speed) from the suitable airport. This is about 690 nautical miles. This advantage permits almost unrestricted world-wide operation, including crossings of both the North Atlantic and North Pacific. It should be noted that deviations from the FAA 60 minute rule were granted to permit Eastern Airline's operation from the continental United States to San Juan, Puerto Rico.

A considerable number of long range, twin engine scheduled flights are being conducted today under the ICAO rule, mainly in the South Pacific by Air New Zealand, Air Pacific, and Air Nauru; from Canada to the Caribbean by Nordair; and over the North Atlantic by Hapag Lloyd (an air freight operation using A300's). The U.S. Air Force and Navy also have regular operations from the West Coast to Honolulu using DC9-derivative aircraft.

In order to assess the effect of granting additional deviations from the FAA 60 minute rule or of adopting the ICAO 90 minute rule, it is necessary to look at the impact of the additional flying time at cruise power on the reliability of the remaining engine and associated essential systems. A board with membership from FAA's Aircraft Certification and Flight Standards elements will consider extended range twin operations certification, engine reliability data, service experience, and provide recommendations regarding requirements for approval of individual operators. ††

REQUIREMENT FOR FAIL-SAFE WING FLAP DESIGN

The relationship of the damage tolerance requirements of FAR 25.571 ("Damage tolerance and fatigue evaluation of structure") and the fail-safe requirements of FAR 25.671 ("Control Systems - General") with respect to wing flaps has recently been the subject of considerable discussion.

General News Continued...

As amended by Amendment 25-23, FAR 25.671 specifies that an airplane must be capable of continued safe flight and landing following any single failure in the flight control system. (The term "wing flaps" is parenthetically included.) Accordingly, an applicant may use fail-safe design so that no single failure will adversely affect controllability, or he may show that the airplane can be safely flown and landed following the failure.

Prior to Amendment 25-45, FAR 25.571 specified that parts of structure, including wings and movable control surfaces, whose failure could result in catastrophic failure of the airplane, must be fail-safe or have safe fatigue life. FAR 25.571 was amended by Amendment 25-45 to introduce damage tolerance evaluation of structure. The introduction of damage tolerance in FAR 25.571 does not, in any way, relieve an applicant from showing compliance with other specific regulations, such as FAR 25.671, where applicable. Similarly, compliance with FAR 25.671 does not automatically relieve an applicant from showing compliance with FAR 25.571.

Due to the manner in which these changes evolved, there has been considerable discussion as to whether flap tracks were considered part of the "flight control system" and, therefore subject to compliance with both FAR 25.671 and FAR 25.571. Based on earlier reviews, FAA advised that flap tracks were considered part of the "flight control system." However, as a result of recent discussion and further review, FAA has determined that flap tracks need not be considered part of the "flight control system." Accordingly, flap tracks need not comply with the fail-safe requirements of FAR 25.671. ††

AIRLINE FLEET QUIETER

A total of 25 U.S. airlines now have achieved 100 percent compliance with Federal noise standards for their aircraft fleets--more than a year ahead of schedule. The list includes such major carriers as American, Delta, Northwest, and Pan American.

An FAA rule, adopted in December 1976, required the airlines to bring their fleets into compliance with FAR Part 36 noise standards in accordance with a time-phased schedule, and with a final deadline of January 1, 1985. The rule applies to all large turbojet aircraft, with certain exceptions, and will have the effect of forcing older planes, such as Boeing 707 and McDonnell Douglas DC-8, out of service unless retrofitted.

The 25 airlines that have achieved 100 percent compliance did so despite 1980 legislation which exempted smaller twin-engine jets having 100 seats or less (like the Boeing 737, DC9, and BAC 1-11) from meeting the Part 36 standards until 1988. None of the 25 made use of that exemption provision. ††

RADIAL TIRES

Replacing bias tires with radial tires is considered a major change under FAR 21.93(a). Engineering and flight test evaluation are to be conducted to establish that the design meets the requirements of FAR 25. †† (Mark Quam, Aerospace Engineer, Regulations and Policy Office Staff)

THE ICING HOLD CONDITION

Evaluation of the hold condition for ice certification is specified in ADS-4 and AC 20-73. The continuous maximum condition of FAR Part 25, Appendix C, should be investigated for the most severe condition using a cloud extent factor of one and an exposure of a full 45 minutes. †† (Mark Quam, Aerospace Engineer, Regulations and Policy Staff)

DISPATCH WITH OPERATIONAL AIR CONDITIONING PACK

The question has been asked, "What certification requirements apply to takeoff with only one air conditioning pack operating?" We offer the following guidance.

Takeoff with one air conditioning pack operating may be allowed provided the airplane has been certified under FAR Part 25 in that configuration. The basic requirements, depending on the specific certification basis, are:

A. FAR 25.831 Ventilation
B. FAR 25.841 Pressurization
C. FAR 25.1301 Function and installations
D. FAR 25.1309 Equipment, systems and installations
E. FAR 25.101 through 25.125 Peformance requirements as appropriate
F. Other certification requirements as appropriate

The rules specified above state that reasonably probable failures shall not cause the following:

1. Harmful or hazardous concentrations of gases or vapors in the crew or passenger compartments (FAR 25.831(c)).

2. The cabin pressure altitude to exceed 15,000 feet (FAR 25.841(a)).

Reasonably probable failures must also meet requirements of FAR 25.1309 (a) and (b)(1), (2). Some judgement may be necessary in determining the need to apply the improbable requirements to failures in the range of 10^{-7} to 10^{-9}.

Section 25.1309 also requires the consideration of multiple failures and their effects.

LINDA GERKE
Technical Support, Western ACO

An air condition pack failure or shut down (from either failure or crew action) is insidious because it may have multiple effects. In evaluating the design for failures, multiple effects should be considered unless the design would preclude such an occurrence. The obvious effects to be assessed in failure evaluation are:

1. Ventilation loss -
   a. Equipment cooling capability
   b. Smoke and fire procedures capability

2. Pressurization loss -
   a. Cabin altitude
   b. Airplane altitude and range

3. The accumulation of smoke, fumes or vapors.

Again the limitations contained in FAR 25.831, 25.841, 25.1301 and 25.1309 apply provided these regulations are part of the type design. ††

General News Continued...

CONTROLLED IMPACT DEMONSTRATION (CID) PROGRAM

The Controlled Impact Demonstration Program is a cooperative FAA and NASA research activity. The key government participants are the FAA Technical Center located in Atlantic City, New Jersey; the NASA-Langley Research Center; and the NASA-Ames Research Center/Dryden Flight Research Facility. The planned impact demonstration is in response to a commitment the FAA made to Congress to improve airline safety and is currently scheduled to take place in late October.

The purpose of the CID Program is to validate technology that can improve aircraft occupant crash survivability by reducing post-crash fire hazard and improving crash impact protection. The CID is currently scheduled for the end of October.

The possibility that occupants of a transport aircraft will survive a crash can be significantly increased by reducing or minimizing fuel fires and incorporating crashworthy design features. The post-crash fireball resulting from ignition of the spilled fuel during crash deceleration, wing break-up, and fuel tank(s) rupture result in a high percentage of the transport crash fatalities.

The FAA and NASA will conduct a full-scale air-to-surface impact-survivable "impact demonstration" with a remotely piloted transport aircraft. The aircraft, a Boeing 720, is a typical four-engine jet intermediate-range design which entered airline service in the mid-1960's. The physical design features and construction practices are common to United States and foreign airframe manufacturers. Airframe structure, cabin interiors, flight deck, seating/restraint systems, fuel and propulsion systems, and flight control and avionic systems are representative of the industry cross-section. The airborne on-board data acquisition system(s) is designed to collect aircraft and experiment performance data from launch of the flight to surface impact and deceleration to stop.

The demonstration is designed to be representative of an air-to-surface impact survivable accident, such as a final approach and landing, a missed approach, and/or a takeoff abort. For controllability, the aircraft's landing gear will be retracted, with flaps (as required). The selected airspeed and impact velocity should maintain fuselage integrity while acquiring vertical impact pulse and longitudinal acceleration data. Ground implanted obstructions at the impact location will rupture the wing fuel tanks to insure antimisting kerosene (AMK) dispersion, and the resulting fuel spray will be exposed to a positive ignition source. Once the aircraft has decelerated to a stop, crash/fire rescue will provide immediate protection for it. Anthropomophic dummies will be placed on board to measure the effect of the impact on human bodies. Aircraft and experiment data will be recorded by a video camera on-board the aircraft and the information simultaneously transmitted via a telemetry link to ground recorders.

The FAA and NASA will jointly collect post-impact test data and conduct the analysis of the data. Each agency will publish separate final reports covering the specific experiments, systems integration, flight operations, impact demonstration, etc., sponsored by that agency. They will issue jointly an executive summary and other reports covering those aspects of the effort common to both organizations.

††

New Faces

DARRELL M. PEDERSON, Assistant Manager, Aircraft Certification

Darrell Pederson was named the Assistant Manager of the Northwest Mountain Region's Aircraft Certification Division in February 1984. Prior to joining the FAA 15 years ago as a flight test engineer, he worked at Lockheed-California as an aerodynamicist. His most recent position was as Assistant Manager of the Seattle ACO

STEVEN B. WALLACE, Manager Regulations and Policy Office

Steven B. Wallace was selected as Manager of the Regulations and Policy Office in April 1984. Prior to that time, he was with the FAA's Northwest Mountain Regional Counsel's Office and worked frequently with the Aircraft Certification Division.

The Designee Newsletter welcomes Jill DeMarco to its staff as co-editor.

Ms. DeMarco is Technical Publications Editor in the Transport Directorate's Technical Support Group, and serves as the principal point of contact on matters relating to the Continued Airworthiness Directives (AD) Program. She is editor for all Northwest Mountain Region-issued AD's and related documents which concern transport category airplanes and appliances.

point of view

This is a new feature of The Designee Newsletter. In it, we hope to provide a general forum for expressing opinions and sharing information concerning aircraft certification matters. Readers are invited to submit articles for publication to the Editor of the Newsletter.

The following articles were contributed by Robert Hall, Supervisory Aerospace Engineer, Systems and Equipment Branch, Los Angeles Aircraft Certification Office.

COVERAGE OF MONITORS

For any system, each particular monitoring technique will be designed to detect a specific class of faults. In my view, determining the specific coverage of each such monitor, expressed numerically perhaps as its probability of detecting faults from among all possible faults of all classes, is of limited usefulness, and then only if accurately quantifiable. In addition, any published values of "typical" or "average" numerical measures of coverage may be highly misleading inasmuch as the monitoring methods used in various specific systems may exhibit wide variances from the published values.

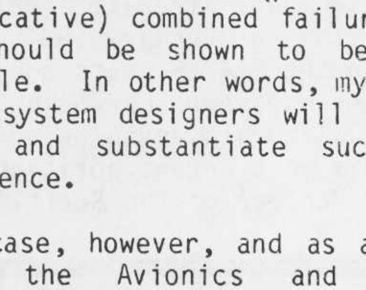
The important considerations for a critical system which depends on self-monitoring are: (1) all classes of faults be determined and/or correctly postulated (which has everything to do with personal experience, system knowledge, and introspective analysis, and little, if anything, to do with numerical calculations); and (2) a set of monitors be provided which will detect these faults to the "extremely improbable" requirement.

In summary, the total coverage of all monitoring techniques used is the important issue, not any numerical measures of the coverage of each particular monitoring technique. ††

EXISTENCE OF "CRITICAL IRREDUCIBLE REMNANTS" IN AVIONICS AND/OR ELECTRICAL SYSTEMS

For purposes of this discussion, a "critical irreducible remnant" is defined as a small remaining part, or "remnant," of a system which must be classified as critical, but which has neither independent monitoring nor independent redundancy. It is my contention that all critical systems will be designed with an architectural scheme such that no "critical irreducible remnants" will exist. An example of typical design practice is a critical fail-passive system composed of an operational subsystem and/or subfunction, and a monitoring subsystem and/or subfunction. If these subsystems and/or subfunctions are truly independent, then each falls into only the essential category because the only critical event is the (probabilistically multiplicative) combined failure of both, which should be shown to be extremely improbable. In other words, my contention is that system designers will continue to provide and substantiate such required independence.

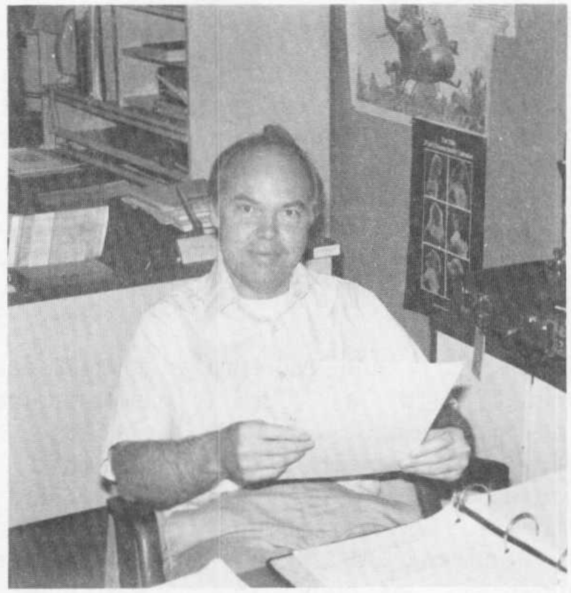
In any case, however, and as a matter of policy, the Avionics and Electrical Systems Section of the Los Angeles Aircraft Certification Office is not prepared to give serious consideration to any substantiating data purporting to show that any such "critical irreducible remnants" meet the "extremely improbable" requirement. ††



Special Topic

STRAPDOWN ATTITUDE SENSOR CERTIFICATION - FAR 25 AIRCRAFT

The intent of this article is to convey information to FAA project engineers and DER's concerning certification of strapdown attitude sensors on Part 25 aircraft. This information exchange should not be construed as defining certification requirements or describing policy and procedures. It represents a compilation of inputs from various Aircraft Certification Offices (ACO) and other appropriate sources (National Resource Specialists, FAA Headquarters) aimed at making our jobs easier to perform and providing for more uniform application of the rules in all ACO's.



DENNIS NEWTON
Flight Test, Western ACO

1. Candidate Systems: The specific systems being addressed are Attitude Heading Reference Systems (AHRS) and Laser Gyro Systems, which are microprocessor-based, digital devices. These systems (sensors) are proving to be attractive replacements for conventional Vertical and Directional Gyros (VG's and DG's) and also the attitude portions of Inertial Navigation Systems (INS). In fact, most suppliers have systems with navigation capability available, in addition to the attitude data, which are promoted as being complete replacements for INS's.

The following is a list of systems, either already FAA certified or slated to be certified in the near term:

AHRS

Sperry SRS 1020 - Certified on L-1011 (amended TC - with limitations).

Collins AHS-85 - Certified on G-159 (STC) and soon to be on the SF-340 (TC).

Litton LTR-81-01 - Certified on the DC-9-80 (amended TC).

Honeywell LaserRef YG1779A - Certified on several aircraft (STC).

Sperry AHZ-600 - Slated for certification on the DHC-8 (TC).

Attitude and Nav

Sperry IONS 1020 - slated for certification on the DC-10 (STC).

Litton LTN-90 - On the A-310, slated for FAA certification soon.

Honeywell LaserNav YG1761 - Certified on several aircraft (STC).

The Honeywell LaserRef is a spin-off of the LaserNav which is a spin-off of the Honeywell strapdown attitude system type certificated on the Boeing 757/767 airplanes (per Part 25, through Amendment 42).

In addition to the companies listed above, King Radio Company and Global Navigation Corporation are planning to introduce their new AHRS in the near future.

2. Criticality Level: Display of pitch and roll attitude in the cockpit is considered to be a critical function. Therefore:

a) Simultaneous loss of all attitude should be shown to be extremely improbable (on the order of 10^{-9}).

b) Presentation of hazardously misleading roll attitude to both primary attitude indicators simultaneously should be extremely improbable.

Special Topic Continued...

c) Presentation of hazardously misleading pitch attitude to both primary attitude indicators simultaneously should be improbable (on the order of 10^{-6}).

d) Presentation of hazardously misleading roll attitude to either of the two primary attitude indicators should be improbable.

Items (a), (b), and (c) imply common mode failures, such as "high temperature" induced shutdown of the systems or software errors. The software should be considered "critical" from the Radio Technical Communications Association (RTCA) Document DO-178 point of view for strapdown systems providing sole source of attitude.

Item (d) defines that the hardware is "essential." The Failure Modes and Effects Analysis (FMEA) and/or Hazard/Fault Tree Analyses should support this finding.

"Misleading" pitch and roll attitude cannot be quantified as a fixed value for all aircraft. Generally speaking, four to five degrees of error has been the value used. The primary concern is IFR operations close to the ground where terrain clearance/obstacles could present a problem to the pilot or autopilot (i.e., autoland and/or autopilot engaged for takeoff climb).

3. System Architecture: The number of systems (sensors) being installed will also determine the criticality level. If only one strapdown device is being installed as a replacement for a conventional attitude source on a dual or triplex attitude airplane, the installation is non-essential.

However, a need for going beyond the normal system functional and installation check (described below) exists, principally dictated by the fact that the FMEA and Hazard/Fault Tree Analyses do not support the requirements of an "essential" system. Accountability should be made for:

a) Multi-axis Failures - The FMEA's generally do not rule out the combined pitch/roll attitude failures. If this failure condition can propagate through the autopilot, a need may exist for demonstrating multi-axis autopilot hardovers, as described in FAA Advisory Circular AC 25-1329A. If the autopilot system architecture is such that the failure cannot get through to the control surface (i.e., input sensor screening, fail-passive autopilot, reasonableness tests, etc.), the demo requirement may not be needed. Be aware of the fact that most fail-passive, cruise mode autopilots may not be truly fail-passive when re-configured to reversionary modes. A good clue is to determine if the basic airplane type certification demonstration included single-axis autopilot hardover testing.

b) Instrument (Attitude) Monitor - If the Processor FMEA does not account for multi-pin (i.e., adjacent pin) failures and does not demonstrate that undetected faults are improbable, a need probably exists for having at least one instrument (attitude) comparator in the cockpit to alert the pilots to the fact that one of their attitude displays is in error.

Incidently, most Electronic Attitude Direction Indicators (EADI) have the attitude monitor included in the Electronic Flight Instrument System (EFIS) design.

c) Attitude Sensor Intermix - If the applicant is seeking certification credit for sensor intermix (e.g., VG/DG on the Captain's side and AHRS on the First Officer's side), compatibility of the two systems should be demonstrated. This means that there should be no excessive attitude monitor trips, no adverse influence on system availability (such as autoland) due to monitor trips, etc. This also holds true for either mode of AHRS operation (NORMAL/BASIC or STANDBY), if this feature is available in the system.

Note that items (a), (b), and (c) also apply for multi-sensor installations.

Special Topic Continued...

4. Installation Details: Validation of acceptable equipment installations includes, but is not limited to, the validation of proper installation considering the combined effects of temperature, altitude, electromagnetic impulse (EMI), vibration, and other various environmental influences. These installation requirements are applicable to critical, essential, and non-essential systems. However, there may be cases where non-essential installations do not warrant the expense of having all, or even part, of these analyses and/or tests conducted. The necessity for non--essential installations, therefore, should be determined on a case-by-case basis by the project engineer based on the specific and individual circumstances involved.

Particular attention should be paid to the following environmental considerations:

a) Vibration - Testing is generally accomplished on the sensor level to DO-160A requirements. The structural mounting provisions on the aircraft should provide assurance that the DO-160A levels are not exceeded when the aircraft encounters gusts as defined in Appendix G of FAR 25. The concern is that the dynamic range of the sensor may be exceeded during this vibration encounter.

b) Temperature - Some systems have temperature monitors built into the sensor block. When the device temperature reaches a given level, the system automatically shuts-down. This condition could represent a common mode failure wherein insufficient cooling is provided to the multiple sensors with the consequent result that they all trip the temperature monitor simultaneously.

Some equipment may be constructed with the cooling mechanization integral to the individual unit. Regardless of how the equipment cooling is accomplished, if the proper operation of the unit is below acceptable levels due to failures of the cooling function, then the cooling function should be addressed by analysis and demonstration, where applicable.

c) Power Bus Transients - Engine failure induced electrical bus transients should not result in attitude being off or unstable for more than one second and should not affect displays on more than one side of the aircraft. If power-up initialization or self-tests are started by the transient, there should be no distracting change in attitude. Recognizably valid pitch and roll data should be available within one second. For most airplanes, an engine failure after takeoff will simultaneously create a roll rate acceleration, new pitch attitude requirements, and an electrical transient. Attitude information is paramount; transfer to standby attitude or transfer of control of the airplane to the opposite pilot cannot be reliably accomplished under these conditions in a timely enough fashion to prevent an unsafe condition.

In testing this failure mode, switching the generator off at the control panel will usually result in the quickest switching time. Conversely, during an engine failure, as the engine speed decays, the generator output voltage and frequency each decay to a point where the bus control relays finally recognize the failure. This can be a significantly larger disturbance resulting in a different effect on the using equipment. The only known way to simulate this failure is with a fuel cut. Both tests should be conducted.

CHARLES MATHEIS
Systems & Equipment

Special Topic Continued...

For systems which have two operational modes (NORMAL and BASIC), annunciation of the fact that the system is operating in the reversionary (BASIC) mode is largely dependent on the "user" systems architecture. For example, if the aircraft is equipped with a CAT III autoland system or CAT III Head-Up Display (HUD) system, the performance in these modes with Basic Attitude may be degraded to the point where aircraft safety is compromised in CAT III weather conditions. There must then be clear and unmistakable annunciation of the fact that this attitude condition exists.

For triple AHRS installations, switching is provided to substitute the third AHRS for either the Captain's or First Officer's system. Annunciation of the fact that the switched condition is in existence may or may not be required, depending on cockpit layout, pilot work-load considerations, etc. This is an assessment generally made by the FAA project pilot. The same holds true for annunciation of whether or not the third system is inoperative.

5. Software Certification: Suggested software documentation required to support certification is presented in RTCA Document DO-178. Initial certification of the system results in a very large submittal of data to FAA for review/approval. It is recommended that an applicant not be required to re-submit this large data package each time application is made for STC approval of the same system (i.e., different airplane, etc.). Instead, it is suggested that, with the equipment manufacturer's permission, the ACO processing the application inform the ACO holding the initial certification data package of subsequent applications for approval and identify the latest hardware/software modification level. The two respective ACO's thereafter can work together to define any additional data requirements, updates, etc.

Of course, this suggests traceability of hardware/software mod level status by unique part number identification or some other identifiable means, which has not always been the case in the past. RTCA Document DO-178 provides information on configuration management and change status identification.

It also suggests that an automated technique for comparing "certified software" with "modified or improved software" would be very desirable (such as a Source Code Compare program).

Presently, the following ACO's hold the complete software certification data packages for the systems identified:

Seattle ACO:	Honeywell LaserRef - Transport Category System
Long Beach ACO:	Sperry SRS 1020 Litton LTR-81-01 Honeywell LaserNav YG1761 Honeywell LaserRef YG1779A
Wichita ACO:	Collins AHS-85
New York ACO:	Sperry AHZ-600 (forthcoming)
Atlanta ACO:	Sperry IONS 1020 (forthcoming)

6. Ground/Flight Certification Testing:
A sample list of tests is mentioned below which may serve to provide ideas on the appropriate candidate tests for certification. Not all tests described in the list are appropriate for all systems, nor is the list all inclusive. Each system architecture and each aircraft operational approval level must be examined. For example, if the aircraft/system is approved for operation to CAT II weather minimums, it is appropriate that autopilot and flight director approaches be demonstrated with the attitude sources both intermixed (Captain's side "NORMAL"/ First Officer's side "BASIC") and completely downmoded (both sides in "BASIC") to assure that system availability is not compromised and system performance is still adequate for CAT II operations. For a CAT III aircraft/system, a much more comprehensive examination is in order. In this case, the FAA recommends that assistance be requested from the ACO responsible for certificating the CAT III system.

A functional check of other attitude "user" systems should also be included in the TIA, as appropriate (eg., weather radar stabilization, flight data recorder, etc.).

Special Topic Continued...

Once the FAA has reviewed and accepted the certification flight data which demonstrates accuracy of the strapdown attitude sources versus the conventional attitude source it is to replace, it should not be necessary for the applicant to keep repeating the process, provided that the equipment manufacturer or "owner" of the data authorizes its use accordingly.

7. Airplane Flight Manual (AFM): The AFM or supplement, as appropriate, may be either negligibly impacted or may have major impact, depending on system architecture. Based on past experience, it does seem appropriate to remind the crew of the importance of achieving a good system alignment prior to allowing any movement of the airplane away from the gate or ramp position.

8. Maintenance: For systems installation accomplished by retrofit or STC on aircraft operated under Part 121 rules, it is necessary to touch base with the appropriate Aircraft Evaluation Group (AEG) inspector to determine if the following are affected by the modification to the aircraft: Maintenance Manuals/Maintenance Systems Guide (MSG) type analyses, Master Minimum Equipment List (MMEL)/Minimum Equipment List (MEL) documents, Return To Service requirements, etc.

SHARON KENNEDY
Technical Support, Western ACO

Sample Ground/Flight Tests

a) Verify the system performs as intended, providing satisfactory attitude and heading information to the pilot's and co-pilot's attitude and heading instruments throughout the normal airplane flight envelope, including unusual attitudes which may be expected in service.

b) Review the manufacturer's data comparing the strapdown attitude/heading information with that of the existing vertical/directional gyro system or INS.

c) Verify that there is no unacceptable mutual interference between the strapdown system and other systems and equipment items that were previously installed on the airplane.

d) Verify that all controls, displays, annunciations, etc., are satisfactorily identified, accessible, operable, and adequate for direct sunlight and night conditions, and that the overall cockpit lighting scheme is adequate for night operations.

e) Verify that the flight control system functions properly if interfaced with the strapdown system. This functional evaluation may be accomplished during a typical flight profile encompassing enroute, maneuvering, and coupled approach operations.

f) Determine that autopilot multiple-axis malfunctions (hardovers) are not hazardous [refer to FAR 25.1329(f)].

g) Verify that the strapdown system can be realigned in flight after being shut down for more than three minutes.

h) Verify that each strapdown system continues to operate correctly following a simulated aircraft electrical power loss of 15 seconds by removing power from each respective electrical bus.

i) Verify proper operation of the back-up battery and display of appropriate flags as follows:

(1) Pull pilot's strapdown attitude circuit breaker. Note that the system operates correctly on back-up battery power for

Special Topic Continued...

approximately two minutes and then shuts down. Determine that appropriate flags appear on the affected displays.

(2) Repeat for the co-pilot's strapdown system.

j) Verify that attitude/heading data from each system is not lost for more than one second following simultaneous loss of a primary power source (generator, alternator, inverter, etc.) and the associated powerplant.

k) Verify that loss of a single power source does not cause simultaneous loss of both strapdown systems.

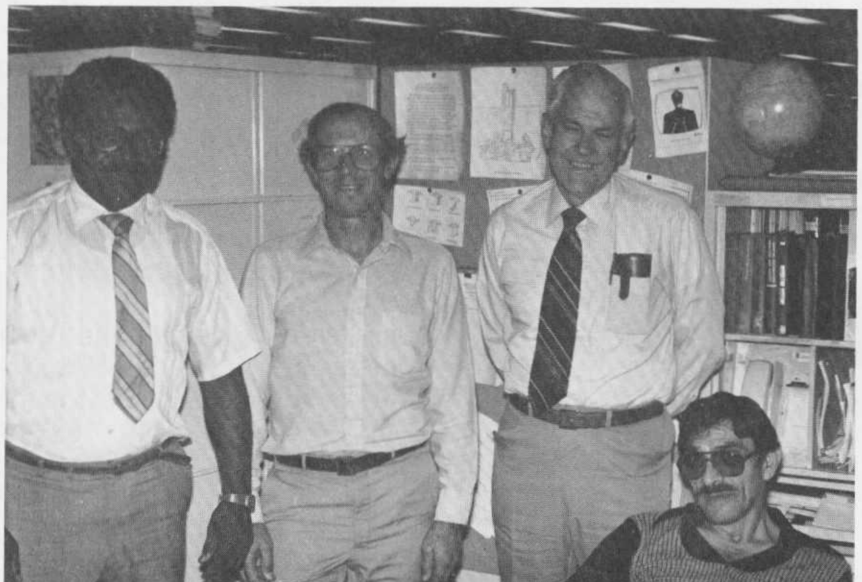
l) While on the ground, determine that the strapdown system provides usable attitude information through 360° of roll and pitch by rotating the platform through 360° roll and pitch and observing the appropriate attitude indicator.

m) Determine that loss of the air data or airspeed input is properly annunciated and that both systems continue to provide satisfactory attitude/heading information.

n) Verify that the comparator monitor provides proper annunciation of attitude/heading display.

††

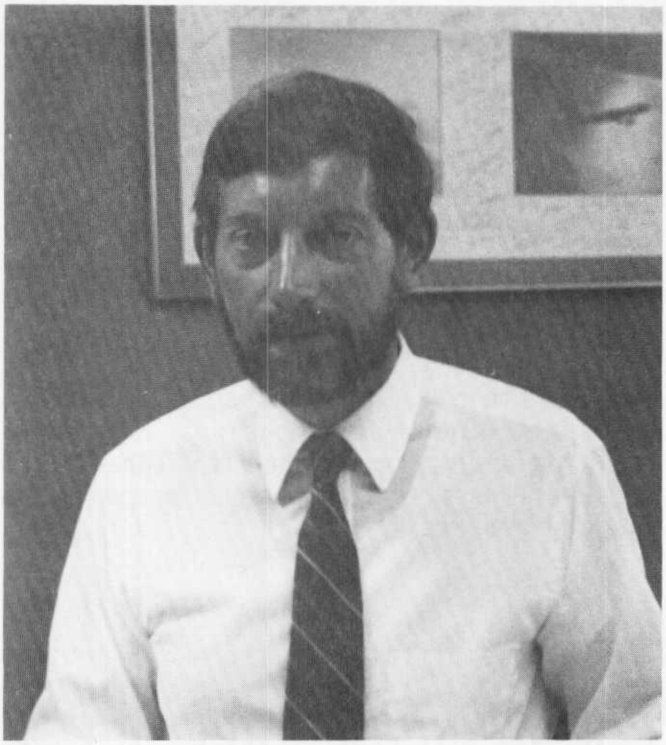
(Submitted by Harold P. Wasinger, Aerospace Engineer - Avionics, Electrical, and Instruments Section, Systems and Equipment Branch, Los Angeles, ACO)



l. to r. ED WHEELER, D. PETERS
R. THOMPSON, W. MULBY
Systems & Equipment, Western ACO

NRS CORNER

[**Editor's Note:** The FAA's National Resource Specialists (NRS) serve a very important function within our organization. Our NRS for Flight Loads/Aeroelasticity (Fixed Wing), Terence Barnes, has written the following article to explain the NRS Program and to give you an idea of some of his activities in his area specialty. Following Mr. Barnes' article is a list of the names, specialties, addresses, and telephone numbers of the FAA's current NRS's.]



TERENCE BARNES

I accepted an invitation to make a brief presentation on the NRS program and my current activities in the Flight Loads/Aeroelasticity area to the independent DER's at their meeting with FAA on April 11, 1984.

This meeting generated several questions relating to the NRS program, and a request to keep the DER's informed of NRS activities via The Designee Newsletter.

First, I'd like to give an overview of the NRS program.

FAA Order 8000.45B (latest version dated January 27, 1983) covers the NRS program, and states its purpose and background as follows:

The National Resource Specialist (NRS) Program is established to assure continued FAA technical competence in the aircraft certification programs.

The rapid technological advances being made in the aircraft industry make it essential for FAA to have a limited number of professional aerospace engineers, engineering flight test pilots, manufacturing inspectors, and airworthiness inspectors who have developed highly specialized, state-of-the-art knowledge and skills in particular technical disciplines; e.g., aeroelasticity, advanced materials, engine design, metallurgy, advanced navigation systems, transport airplane flight management, etc.

The Specialists' functions are as follows:

a. National Resource Specialists shall maintain close and continuous contact with representatives of the aviation industry professional societies, academic and research institutions, specialists in other Federal agencies including the military establishment, and foreign airworthiness authorities to maintain and further develop their specialized professional knowledge and skills.

b. When requested by the Director of Airworthiness, with the concurrence of the Specialists' regional supervisors, the NRS's shall:

(1) Serve as special technical advisors to Washington Headquarters officials;

NRS continued...

(2) Represent the FAA in national and international activities requiring utilization of the technical knowledge and skills of the Specialists;

(3) Participate as technical advisors in the development of FAA type certification regulations and standards, national policy (for issuance by the Administrator), and national directives or advisory circulars to provide procedures and practices in highly specialized technical areas;

(4) Participate in or lead such activities as seminars or symposiums and develop training courses designed to enhance the state-of-the-art knowledge of other aerospace engineers.

The responsibilities of the NRS's include:

a. Serving as special technical advisors to the Aircraft Certification Directorates in the performance of their certification functions;

b. Serving as special technical advisors to regional Type Certification Boards, Airworthiness Directive Boards, Maintenance Review Boards, and Flight Operations Evaluation Board Chairpersons, and on Special Certification Review Teams, when requested;

c. Performing routine technical functions within the Specialist's assigned region, as time may permit.

My current and future activities in the loads/aeroelasticity area are:

Airframe Certification - Technical Advisor on Part 23 and Part 25 airplane loads analysis regulation interpretation, analysis and test requirements. Major activity will be in the area of certification of Foreign Part 25 transports and unconventional Part 23 airplanes.

Analysis Methods - Developing a draft Advisory Circular recommending analysis methods and means of compliance with loads criteria for small airplanes with unconventional empennage configurations.

Research - I am promoting research into the determination of airplane loads for which analysis procedures do not currently exist. One area in which research is being conducted is the determination of horizontal tail stall buffet loads. When the wing wake impinges on the horizontal tail as in a stall condition, the random nature of the pressure variations can result in excitation of empennage structural modes. Loads measured on large transports have indicated high stabilizer tip accelerations, and rolling moments that exceed Part 25 design loads.

I plan to conduct discussions with the major Part 25 transport airplane manufacturers and with NASA Langley to determine if a research program can be put together. In the meantime, concurrent with certification project reviews, I am familiarizing all manufacturers with the potential problem, and requesting that they measure loads during flight test.

Regulations and Policy - Technical Advisor on the loads aspects of Active Controls and Flutter Advisory Circular AC 25.629, discrete source damage loads criteria for inclusion in a revision to AC 25.571, and turbofan and turbopropeller unbalance loads criteria.

Technical Training - Planning a loads course for FAA Airframe Engineers that will cover aeroelastic wing loading, and effects on airplane balance, airplane time history maneuvers, and dynamic gust including power spectral density (PSD) methods. This will give the FAA a better understanding of the current methods used in the aviation industry, and will improve FAA capability to evaluate certification data. ††

NRS continued...

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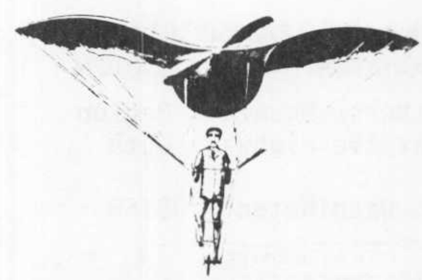
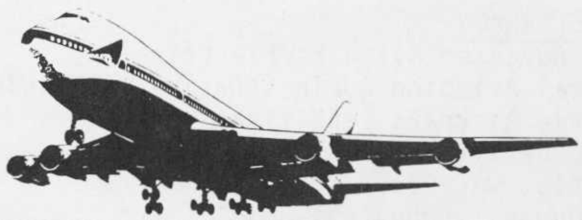


NEW AIAA ASSOCIATE FELLOW

The American Institute of Aeronautics and Astronautics (AIAA) has selected Terence J. Barnes, the NRS for Flight Loads/ Aeroelasticity (Fixed Wing) to be one of the 173 Associate Fellows nominated by the AIAA Associate Fellow Grade Committee. Barnes is the only FAA representative on the 1983 upgrade list, published in the January 1984 issue of Aerospace America. The FAA is proud to have one of its NRS's accepted as an AIAA Associate Fellow. ††

SPECIAL THANKS TO...

- Frank Harmon for photographs of his co-workers at the Western ACO
- Bud Parker, Special Projects Officer of the Aircraft Certification Division, for his technical review of this Newsletter.
- Jerry Mack of the Technical Support Group, for his technical input and advice.
- Mike West and Rick Barnett, of the Seattle ACO, for the photographs which they contributed.



Notes from the Editor

Have any comments, questions, or articles you'd like published in the Newsletter? Send them to: Editor, Aircraft Certification Division, ANM-100, FAA, Northwest Mountain Region, 17900 Pacific Highway S., C-68966, Seattle, WA 98168.

If you, or someone you know, has been inadvertentley left off the mailing list, please submit their names and addresses to the Newsletter Editor, FAA, Aircraft Certification Division, ANM-100, Northwest Mountain Region, 17900 Pacific Highway S., C-68966, Seattle, WA 98168.††

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